

BR. 33003/50

February, 1962

B.R. STANDARD
204 H.P. DIESEL MECHANICAL
SHUNTING LOCOMOTIVES
Nos. D2000—ONWARDS
also departmental locomotives
Nos. 91 & 92

**B.R. STANDARD 204 H.P. DIESEL MECHANICAL SHUNTING
LOCOMOTIVES : NOS. D2000—ONWARDS, ALSO DEPART-
MENTAL LOCOMOTIVES NOS. 91 AND 92.**

LOCOMOTIVE DATA

Type	0 - 6 - 0.				
Weight in running order	30 tons 4 cwts.				
Tractive effort, lbs.:—					
	1st gear	2nd gear	3rd gear	4th gear	5th gear
	15,300	8,840	5,860	3,770	2,020
Wheel base	9ft.				
Wheel diameter	3ft. 7ins.				
Width overall	8ft. 6ins.				
Length overall	26ft.				
Height overall	12ft. 2 $\frac{1}{8}$ ins.				
Minimum curve negotiable	2 chains.				
Maximum speed, m.p.h.:—					
	1st gear	2nd gear	3rd gear	4th gear	5th gear
	3.75	6.50	9.83	15.25	28.50
Fuel tanks	300 gallons.				
Cooling water	40 gallons (approximately).				
Lubricating oil sump	8 gallons.				
Brakes	Compressed air and hand. Vacuum brake equipment provided, giving proportional air braking on the locomotive.				
Sanding	Compressed air operated.				

POWER EQUIPMENT

8-cylinder diesel engine	Gardner 8L3 type, 204 h.p. at 1,200 r.p.m.
Cylinder bore and stroke	5 $\frac{1}{2}$ ins. x 7 $\frac{3}{4}$ ins.
Firing order	1, 5, 2, 6, 8, 4, 7, 3.
Fuel injector nozzle type	Gardner L3.
Fuel injector holder type	Gardner L3.
Pressure at which fuel injector nozzles should be set	2,548 lbs./sq. in. (172 atmos.).
Fuel pumps	C.A.V. B.P.F. 4B.

TRANSMISSION

Fluid coupling	Vulcan Sinclair Type 23, capacity 8 $\frac{1}{2}$ gallons.
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Gear box	Wilson Drewry C.A.5 Type five speed epicyclic gearbox, compressed air operated. Lubricating oil capacity 6 gallons.
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Gear ratio:—

1st gear	2nd gear	3rd gear	4th gear	5th gear
4.07:1	2.33:1	1.55:1	1:1	1:1.87 overdrive

Reverse gear and final drive Type R.F. 11 spiral bevel reverse and final drive unit, compressed air operated, gear ratio 9.82:1. Lubricating oil capacity 8 gallons.

AUXILIARIES

Battery	.....	.....	.....	12 D.P. RSKA.123 or Exide 3FMR-11/1, 24 volt.
Dynamo	.....	.....	.....	C.A.V. type E55A24/140, 24 volt, belt driven.
Starter motors (2)	.....	.....	.....	C.A.V. 24 volt axial type.
Radiator fan	.....	.....	.....	Belt driven.
Compressor	.....	.....	.....	Westinghouse type 4E26, belt driven.
Vacuum exhauster	.....	.....	.....	Westinghouse type 3V72E, belt driven.
Lighting circuit	.....	.....	.....	24 volt.
Oil bath air filters	.....	.....	.....	A.C. Sphinx type.
Pneumatic fuel raising equipment, Lockheed self-sealing couplings. Cab heating equipment.				
Windscreen wipers (4)	.....	.....	.....	C.A.V. electric—independent switching.

DRIVER'S CONTROLS

1. Master switch.
2. Throttle handle (duplicated).
3. Air brake handle (duplicated).
4. Vacuum brake handle (triplicated).
5. Reversing lever (duplicated).
6. Warning horn control (duplicated).
7. Engine "start" button.
8. Engine "stop"—"run" lever.
9. Deadman's pedal (duplicated).
10. Sander lever (1).
11. Handbrake wheel.
12. Cab, marker and panel light switches.
13. Vacuum release valve.
14. Gearbox air pressure hand pump.
15. Hand operated fire extinguishers (4). CO₂ type.

GAUGES AND INDICATORS FITTED

1. Battery ammeter.
2. Engine oil pressure gauges, one in cab, two on engine.
3. Engine oil pressure warning indicators (2).
4. Air brake pressure gauge (duplex) brake cylinders and main air reservoir.
5. Vacuum brake gauge (duplex).
6. Speedometer.
7. Tachometer.
8. Fuel gauges.
9. Gearbox air pressure gauge.
10. Radiator water level gauge (R.H. side of radiator).

FUSES FITTED

1. Main lighting (2).
2. Cab and socket lighting (1).
3. Panel lights and oil pressure indicators (1).
4. Front marker lights (1).
5. Red marker lights (1).
6. Windscreen wipers (1).
7. Heater (1).

DRIVER'S DAILY DUTIES WHEN IN SERVICE

1. Check oil level in diesel engine sump.
2. Check water level in radiator.
3. Check oil level in air compressor sump.
4. Check oil level in vacuum exhaust.
5. Check oil level in gear box.
6. Check fuel oil level.
7. Blow down compressed air reservoirs once every 8 hours.
8. Inspect all driving belts for breakages.
9. Lubricate coupling rods, jackshaft oil boxes and hand brake column.
10. Give one turn to grease cups on water pump, and fuel pump, driving shaft damper, once in 24 hours.
11. Examine and fill sand boxes if required.
12. Examine brake gear.
13. Check that detonators, etc., are complete.
14. Check that fire-fighting equipment is intact.
15. With the engine running visually check the lubricating oil, fuel oil and water systems for leakage, then check that the following pressures are registered:—

Main air reservoir 85-100 lbs./sq. in.

Gear box air pressure 60 lbs./sq. in.

Engine lubricating oil pressure 25-35 lbs./sq. in.

Vacuum brake gauge 21 inches.

16. **At a convenient time during turn of duty** make a short inspection of the locomotive and equipment and check that the apparatus generally is in good working order.

17. "Toggle up" the gearbox brake bands as follows:-

Obtain maximum air pressure, then, holding down the Deadman's pedal, **STOP THE ENGINE**. With full air pressure in the control system engage 1st, 2nd, 3rd and 5th gears at least six times, each time pausing about 5 seconds in each gear position to allow time for the brake bands to engage fully.

Report all known defects at the end of each shift.

STARTING THE ENGINE

1. Check that the handbrake is on, and reversing lever is in **FOR.** or **REV.**
2. Place master switch to on position (this switch controls the lighting and starter switch circuits).
3. Check that the reverse lever is in **FORWARD** or **REVERSE**, it **MUST NOT** be left in mid position.
4. Check that the change speed control is in **NEUTRAL** position.
5. Check that the engine stop control lever is in **RUNNING** position.
6. Press the trigger button on the fuel rack front cover to set the fuel rack to maximum position if the engine is cold.
7. Press the starter button and release immediately the engine fires. Under no circumstances must the starting button be kept depressed if the diesel engine fails to turn over immediately. If the engine turns but does not fire almost immediately release starter button; if no cause is apparent to the driver the matter must be reported. If the starter button is released it **MUST NOT** be re-engaged until the engine has stopped rotating.

EMERGENCY PROPULSION STARTING

In the event of a failure of the electrical starting equipment the following procedure should be adopted:—

NOTE: A length of line about 30 yards long **MUST BE SANDED** before attempting a propulsion start, and maintenance staff representative should be present.

1. Obtain the use of another locomotive (steam or diesel) to tow or propel the dead locomotive, **ADVISING THE DRIVER THAT A SPEED OF 13 m.p.h. MUST NOT BE EXCEEDED.**
2. To obtain air pressure to operate the gear box, first close the isolating cock R.H. side under the control desk, then turn the 3-way cock so as to connect the auxiliary hand pump direct to the gear control and reverse valve.

3. Operate auxiliary hand pump until 60 lbs./sq. in. air pressure is shown on the gear box air pressure gauge.
4. When air pressure is obtained place reverser in the required position (corresponding to the direction which it is proposed to move the locomotive), and engage 4th gear.
5. Call on the driver of assisting locomotive to move in the arranged direction.
6. When the engine fires signal the assisting locomotive driver to stop. Return gear lever to NEUTRAL, uncouple assistant engine, return the 3-way cock and the air isolating cock to their normal positions.
7. Check that the engine lubrication oil pressure gauge is showing 25-35 lbs./sq. in.
8. When the main air reservoir pressure has reached 85-100 lbs./sq. in. and the gear box pressure 60 lbs./sq. in., the locomotive may be moved under its own power.

TO START THE LOCOMOTIVE

Before attempting to move the locomotive:-

1. Check that the main air reservoir pressure is 85-100 lbs./sq. in.
2. Check that the gearbox air pressure is 60 lbs./sq. in.
3. Depress the Deadman's pedal and make an emergency air brake application and release to obtain control of the Deadman's system, then place the reverser into the FORWARD or REVERSE position according to which direction it is desired to run. Check that 21 ins. of train pipe vacuum is obtained.

NOTE : Running with radiator ahead is Forward movement.

4. With the Deadman's pedal still depressed, make a full service application of the air brake followed by a release and check that this registers on the air brake gauge (brake pressure is 60 lbs./sq. in.).

Place the air brake handle into the OFF position, then test the brakes by making a VACUUM brake application and check that the air brake cylinder pressure rises after the train pipe vacuum has fallen.

5. With the power brake handles in the running position release the Deadman's pedal, turn the handbrake wheel to release the brake at the same time check that the Deadman's device has operated.
6. Apply the air brake fully.
7. **To move the locomotive:-**

Depress the Deadman's pedal, then with the air brake still applied and the engine running at idling speed, engage 1st gear on the change speed quadrant. Release the power brake and at the same time open the regulator about one-quarter. The locomotive will then move away from rest and may be accelerated as required.

IMPORTANT: 1st gear must always be used when starting from rest irrespective of direction of travel.

8. Gear Changing

- (a) Changing up. When the maximum speed in 1st gear is obtained, close the throttle handle and smartly engage 2nd gear, re-opening the throttle after a short pause.

The same sequence of operation should be followed when changing from 2nd to 3rd - 4th - 5th gear.

- (b) Changing down from a high gear to the next lower gear is effected by moving the change speed handle to the next lower gear position.

9. If the engine is running at something approaching the maximum revolutions (maximum 1,200 r.p.m.) on a given gear a lower gear must NOT be engaged.

Always change gears progressively, i.e., 1, 2, 3, 4, 5, and 5, 4, 3, 2, 1. NEUTRAL can, however, be engaged direct from any gear by pulling the lever smartly back to the neutral position. There must not be any pause between the gear positions. Do NOT change up or down more than one gear at a time. DO NOT COAST IN NEUTRAL.

10. Do NOT allow the locomotive to remain at rest with the engine running, gears engaged, and brakes applied, other than for stops of momentary duration. Always engage NEUTRAL gear if not re-starting immediately.

11. If it is found that any gear is slipping or not operating; toggle up the gearbox brake bands of the gear concerned as shown in item 17 under "Driver's daily duties when in service," or in item 2 under "Stabling the locomotive." If this does not stop the gearbox brake bands slipping the locomotive must be withdrawn from service and the matter reported immediately.

12. Overloading will result in excessive slip and eventual overheating of the fluid coupling. Do not remain in a high gear when the engagement of the next lower gear will ease the load and so enable correct engine revolutions to be maintained without fluid coupling slip.

A check must be kept on the tachometer and if it is found that the r.p.m. are falling rapidly a lower gear must be engaged. Do NOT change into another gear, unless the locomotive is travelling at a speed that is within the range of that gear, otherwise overspeeding of the engine will occur with possible damage to the engine and transmission. When working a train on a falling gradient it must be watched that the weight of the train does not push the locomotive to an extent that the maximum r.p.m. of the engine is exceeded throughout the gear range. Maximum r.p.m. 1,200.

If the driving wheels slip close the throttle handle and do not operate the sanders until the wheels have stopped slipping. DO NOT APPLY THE BRAKES TO PREVENT THE WHEELS FROM SLIPPING.

13. Vacuum brake equipment is fitted to enable fitted stock to be worked. The vacuum brake is so arranged that application of the driver's vacuum brake handle will operate the vacuum brake and at the same time give a proportional application of the air brake

on the locomotive. The application of the driver's air brake valve **WILL NOT** operate the vacuum brake.

14. On release from vacuum fitted stock when the vacuum hose is replaced on the dummy coupling place vacuum brake valve into running position and then make a full air brake application followed by a release and check that this is indicated on the air brake gauge before moving the locomotive.
15. Should the vacuum exhauster fail through any cause, e.g. broken belt, stop the locomotive. Before moving again operate the vacuum release valve to destroy the vacuum in the reservoir, then make a full air brake application and release and check that the air brake gauge responds.

16. **High Water Temperature**

- (a) Check water level indicated on radiator gauge; if low check for leakages.
- (b) Check that the radiator fan driving belts are not slipping or displaced.

17. **Low Oil Pressure**

If the oil pressure falls below 25 lbs./sq. in. or if the oil pressure indicator lights (coloured red) on the instrument panel should continue to glow when the engine is accelerated, the trouble must be investigated as soon as possible:-

- (a) Check for oil-water leaks.
- (b) Check water level in radiator.
- (c) Check that the radiator fan driving belts are not slipping or displaced.
- (d) Stop engine, then check oil level in engine sump, if normal, restart engine and listen for any unusual engine noises.
- (e) If the oil pressure continues to drop after the above check, stop the engine and report the matter to the Depot.

TO STOP THE LOCOMOTIVE

- (a) Close the throttle handle.
- (b) Apply the air brake.
- (c) When at rest shift the gear lever into neutral smartly.
- (d) Release the Deadman's pedal.
- (e) If standing for more than 5 minutes stop the engine.

TO REVERSE THE LOCOMOTIVE

DO NOT ATTEMPT TO REVERSE THE LOCOMOTIVE WHILST IT IS MOVING.

- (a) Close the throttle handle.
- (b) Apply air brake to full service position to hold the locomotive stationary, keep the Deadman's pedal depressed.
- (c) Place gear change lever into **NEUTRAL**—the reversing gear cannot be operated until this is done.

- (d) Move reversing lever into the desired position.
- (e) Engage 1st gear and then release the air brake.

TO STOP THE ENGINE

Pull the stop control lever from the "RUN" to the "STOP" position. When the engine has stopped, return the engine stop control to the running position.

STABLING THE LOCOMOTIVE

1. Holding down the Deadman's pedal, to maintain full air pressure in the control system, stop the engine then return the stop control lever to the "Running" position, then:-
2. Engage 1st, 2nd, 3rd and 5th gears, at least six times pausing about 5 seconds in each gear to maintain automatic adjustment of the epicyclic brake bands.
3. Release Deadman's pedal and apply the handbrake.
4. Place master switch to "Off".

Leave:-

- (a) Air brake handle in release position.
- (b) Change speed gear lever in "Neutral" position.
- (c) Reversing lever in either "Forward" or "Reverse".
- (d) Vacuum brake handle in "Off" position.
5. Blow down main air reservoirs.
6. Examine locomotive for oil or water leaks, broken or displaced belts, defective brake equipment, etc. Close windows and lock doors.

TOWING THE LOCOMOTIVE (in an emergency)

1. Place the gear change lever in NEUTRAL position.
2. Apply the handbrake.
3. Raise the centre section of the cab floor. Lift the ring of the isolating locking plug plunger on the top of the reverse gear box (final drive) and rotate through a quarter of a turn, check that the locating slots are clean (an accumulation of dirt will prevent the isolating locking plunger from engaging properly).
4. Slowly move the reverser handle from either forward or reverse to the opposite direction, the isolating locking plug will drop and engage the reverse clutch in the neutral position.
5. Move the reverser handle into the mid position between forward and reverse. Press down onto the top of the isolating locking plug and ensure that the plug has dropped the maximum distance. Check that the final drive is isolated by turning manually the coupling between the reverse gear and the change speed gear boxes.
6. Close gear box compressed air isolating cock.
7. To free the reverse clutch rotate the isolating locking plunger back to the "FREE" position when towing is completed. When air pressure is not available use the auxiliary hand pump to build up pressure to operate the reverse clutch.

8. Cancel the Deadman's application, by depressing the Deadman's treadle, then place the air brake handle into the emergency position.
Allow the brake cylinder pressure to reach maximum pressure of 65 lbs./sq. in.
9. Stop the engine.
10. Destroy the vacuum, train pipe and reservoir.
11. Blow down air reservoirs.
12. Check that the brake cylinder and main air reservoir gauges are showing zero, then place air brake handle to OFF position.
13. Release the handbrake when the assisting locomotive has been coupled up.

NOTE : If the locomotive is being towed any distance the jackshaft connecting rods and coupling rods must be removed and the jackshaft wedged.

VACUUM BRAKE DEFECTS, PROCEDURE

When a test is to be made in connection with a vacuum brake defect the following procedure is to be adopted:-

1. With the diesel engine running check that the vacuum exhauster belts are not slipping or displaced.
2. Obtain control of the Deadman's device and keep the pedal depressed during the following tests:-
3. Take the vacuum hose at the leading end of the dummy coupling, then accelerate engine to about 900 r.p.m. Watch the vacuum gauge and if more than 3 ins. of vacuum is obtained it is an indication that there is a stoppage in the system which must be located and removed. Replace pipe at the leading end and repeat the operation at the trailing end.
4. Create 21 ins. of vacuum and STOP engine; note the time taken for the vacuum to fall to 12 ins. in the train pipe. If this is less than 20 seconds it is an indication that undue leakage is occurring and this must be found.
5. Restart engine, place driver's brake valve in running position. Take the hose pipe off the dummy coupling at one end of the locomotive and place the special test disc, with the $\frac{1}{4}$ in. leak hole, on the end of hose pipe. Accelerate the engine to approximately 900 r.p.m., ascertain if 21 ins. of vacuum can be created and maintained.

If the vacuum brake is a failure, control of the air brake must be obtained as shown in items 14-15 under "Running."

DEADMAN'S DEVICE

If the Deadman's device operates, to regain control:-

- (a) Depress the Deadman's pedal.
- (b) Make an emergency air brake application, then return the air brake handle to OFF position, checking that the air brake gauge responds accordingly.

